The Citrus Industry

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BIG CITRUS CROP IN PROSPECT

According to government estimates, the citrus crop of the present season will be far in excess of the production of a year ago. This federal forecast is in line with the general layman's view of the situation. Certainly, here in Florida there is every prospect of a very material increase over last year's production.

For the country as a whole, taking in all citrus producing areas, the condition of oranges on Sept. 1, according to the government survey, was 80 percent of normal, compared with 77 percent a year ago and the ten-year average of 72 percent.

The greatest increase over last year is in grapefruit with a condition of 73 percent as against 62 percent of normal a year ago and the same condition for the ten year average.

Only in lemons is there a falling off of a condition from that of last year. The condition of the California lemon crop is placed at 74 percent of normal compared with a 1943 condition of 79 percent.

But this increase in average condition does not tell the whole story, for there has been a very marked increase in bearing acreage in all of the producing states which must be taken into consideration in estimating the total crop.

Florida oranges are up four percent from last year, with a condition of 76 percent of normal; grapefruit up 12 points from 59 percent to 71 percent; and tangerines up 25 points to 74 percent of normal. With an estimated 6,000 acres of new groves coming into bearing in this state, with the increasing acreage in new bearing groves in other citrus producing states, the increase in production will greatly exceed the indicated improvement in condition. Nothing short of some disastrous freak of nature, such as a violent storm or excessive freeze, it would seem, can intervene to prevent the harvesting of a record, or near record, crop of citrus fruits.

Just what effect this great increase in volume may have upon the market price of citrus is problematical. Certainly the situation calls for careful consideration and careful planning on the part of growers everywhere. With the war situation as it is, the demand for citrus fruits for the armed forces will probably be relaxed. That this reduction in Federal purchases can be made up by increased civilian buying is problematical; certainly not without increased effort in the way of increasciency.

With the shipping season already under way on early grapefruit and heavy shipments of both oranges and grapefruit just in the offing, it is imperative that steps should be taken at once to increase civilian demand and to so control distribution that there may be an even flow of fruit to markets where demand exists and to prevent a flux where demand is light or non-existent. Such a program demands the closest cooperation between the growers and shippers of Florida, Texas and California. The time to inaugurate such a program is now.

Properly handled, and with government cooperation, even the great crop now in prospect should be marketed with profit to the growers — but the growers themselves must take the initiative in bringing about the proper organization.

EARLY SHIPMENTS UNDER WAY

Reports of the shipment of early grapefruit to Northern markets indicates that shipments this season began to roll a full month earlier than a year ago. Early bloom and a favorable growing season are given as the reasons for this excessively early shipment of fruit.

It is to be hoped that the fruit now going to market not only passes the state and federal inspection tests, but that it will pass the final test of the consumer palate. In years gone by there has been complaint that some of the early fruit finding its way to Northern markets has been unpalatable, a condition which has operated to prejudice the ultimate consumer against later shipments. It is devoutly to be hoped that no such condition shall be permitted to exist this year.

That the citrus inspection bureau is doing and will continue to do everything possible to see that any fruit shipped meets the legal tests, there can be no doubt. The trouble is that the legal standards do not always guarantee that the fruit will meet the test of the palate of the consumer. Only the grower himself can guarantee that by seeing that no fruit leaves his grove which he would not be willing to place on his own table and eat himself.

When growers are willing to set that standard for themselves, and abide by it, they may miss a few dollars from early shipments but they will more than make up for any such loss by greater returns from later shipments. That is one case where a dollar in the hand is **not** worth two on the

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Studies On The Use Of Formaldehyde And Sodium Ortho-Phenyl-Phenate In The Control Of Decay In Citrus Fruits[1]

The wartime necessity for the most efficient use of both storage and transportation facilities has demanded increased efforts of research workers in order to insure sound delivery of fresh fruits and vegetables. During the past few years the U. S. Department of Agriculture Field Station at Orlando, Florida, has tested many new compounds for their effect in the control of decay of citrus fruits in storage or transportation. Among the many compounds tried, sodium ortho-phenyl-phenate (Dowicide A) showed great promise as an agent for reducing decay, but its use was limited because of the danger of injuring the rinds of oranges when the concentrations were high enough to be effective for control of decay.

On September 3, 1943, preliminary tests were begun for the purpose of determining whether this rind injury could be reduced, if not prevented, by the addition of formaldehyde solution (U. S. P. strength, 37 percent by weight, equivalent to Formalin) to an aqueous solution of Dowicide A. Inasmuch as oranges were not ready for the market at this time, the preliminary tests were conducted with Villa Franca lemons. The lemons were held for two minutes in a two percent solution of Dowicide A at 110° F. This particular treatment was chosen because it is the procedure recommended in the borax treatment of citrus fruits. After the Dowicide treatment, the fruit was rinsed, allowed to dry, stored for two weeks at 70°, and then observed for degree of rind injury. Considerable exploratory work indicated that the formaldehyde solution must be added to a solution of the Dowicide A before it is diluted to its final strength and that the optimum concentration of formaldehyde is about one part by weight of the solution to five parts of Dowicide A.

The results obtained in these experiments with lemons are shown in table 1. The table represents the average of ten experiments. The Dowicide A alone, when used in these tests, caused rind injury to 78 percent of the fruits. Addition of formaldehyde reduced the injury to 8 percent.

Similar tests were made with early and midseason oranges. The temperature of the disinfectant bath was lowered to 100° F. and formaldehyde solution was added at the rate of one part by weight to 4.5 parts of Dowicide A, this latter concentration proving a little more effective than that used with lemons. The treated fruits were stored for one week at 50° F. and then for one week at 70° F. In table 2 will be found the results obtained with early and midseason oranges. The figures represent the average of 14 experiments. In each experiment a hundred or more fruits were used in each treatment. The results in table 2 are therefore based on observations made on between 4,200 and 5,000 individual fruits. When Dowicide A alone was used in the treatment, 21.9 percent of the oranges showed rind injury. The addition of formaldehyde reduced this injury to 6.4 percent. Decay in the untreated lots amounted to 13.8 percent. The Dowicide treatment reduced this to 2.5 percent and the addition of formalin apparently did not materially affect the fungicidal effectiveness of the compound.

Before extending these tests to commercial packing houses, it was considered de-

(Continued on page 15)

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Progress Report On The Purple Mite And Its Control

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At Meeting of
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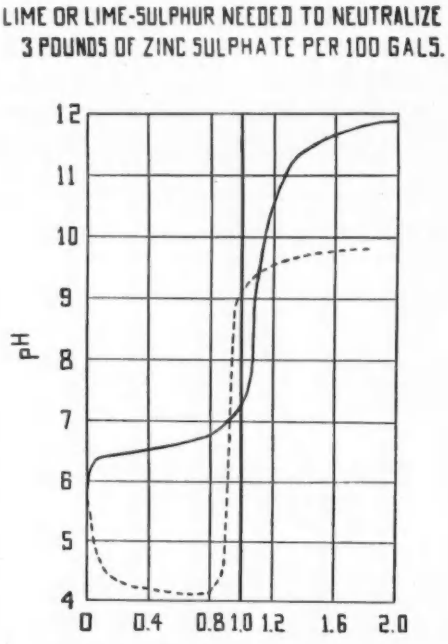
The purple mite, **Paratretranychus citri** McG., belongs to a group of mites which are commonly called red spiders. This mite is found in all citrus areas in Florida and has been known to be in the state since before 1885 (Riley (5)). In the Proceedings of the Florida State Horticultural Society for 1905. A. B. Harrington discussed contral of the usual red spider infestation. Quayle (6) states that it has been a serious pest in California since 1900, and it has also been of more or less importance in Texas and Alabama. Until recently it has been considered of minor importance in Florida. In 1929 Yothers (8) stated that 95 percent of the total damage caused by insects and mites was attributed to 6 species which did not include the purple mite, and of 10 species named as being of commercial importance, the purple mite was listed in eighth place. It is rather difficult to determine just when it did become of major importance in this state but reports of infestations have been increasing during the past 6 years with the winter of 1943-44 holding the record, but infestations of a local nature have been common for years. For some of the early descriptions of injury caused by withertip (**Colleetotrichum gloesporioides** Penz), and from our present knowledge of purple mite injury and the ensuing infection of the affected twigs by the withertip fungus it seems safe to assmue that the purple mite was responsible for some of the injury reported as withertip. In 1931 Rhoads and DeBusk (7) described a type of withertip which developed during winter months after the roots had been injured by drought, and the picture of an affected tree shows bare twigs and wilted leaves similar to injury caused by the purple mite. During the winter of 1938-39 heavy purple mite infestations occurred in the Sebring and Lake Placid areas as well as at Port Mayaca, Merritt Island, and to some extent in Orange and Polk counties. During that winter several incidents occurred which indicated that the withertip fungus was secondary and the primary injury was caused by a combination of dry weather and a purple mite infestation. To illustrate, in early November of 1938 dead branches and withertip developed in a number of blocks of orange trees in a rather large grove which was not suffering to any extent from dry weather. It so happened that the Florida red scales were becoming abundant in some blocks, and they were sprayed with an oil emulsion. In late December the dying back of some branches recurred in certain blocks, and upon investigation it was found that where the oil spray had been applied during early December there was no injury and the foliage was free of purple mites, whereas in the blocks where injury had recurred the leaves and especially the twigs were heavily infested with mites. Since then many similar observations have been made by the writer and others who are in close touch with this work. Further information about purple mite injury will be discussed later in this paper.

The reasons for the recent general increase of fall and winter infestations have not been determined; however, there are several factors which may have a general bearing on the problem. The purple mite thrives on young, vigorous foliage, and under the present fertilizer program practiced more of that type of foliage during the fall and winter months than there was under the old N-P-K program when many groves were deficient in various other nutrients. Under the old program there was preponderance of more or less chlorotic leaves unsuitable for purple mite development during the fall and winter months, but under the present fertilizer program practiced by a large majority of growers, the summer and fall flushes of growth appear in greater abundance than formerly which furnishes a good supply of food for the mites. The purple mite thrives during periols of cool weather so the cool weather, beginning last October, and the presence of new, vigorous growth which was especially abundant last fall may have been causes affecting the mite population in so many groves during the past winter.

Some growers are of the opinion that nutritional sprays are responsible for the increased number of purple mite infestations. At the present there is no indication that zinc or copper sprays applied during the spring have had any influence on the following fall and winter infestations. In fact, heavy fall infestations were observed in groves that had never received any sprays containing zinc or copper. Some of the severe infestations of 1938-39 were in groves where the practice of applying nutritional

sprays had not yet been adopted. To give a specific illustration, at the Citrus Experiment Station there are two experimental fertilized blocks (Blocks 8 and 10) of Pineapple oranges adjacent to each other. Each spring Block 8 receives sprays containing compounds of zinc and copper but in Block 10 those materials are supplied as a soil application. During the season of 1942-43 there was a crop of fruit on both blocks but the strain of the crop was much more noticeable on the trees in Block 10 than in Block 8 which was in a more vigorous condition. In December of 1942 it was necessary to control a purple mite infestation in Block 8 but mites were very scarce in Block 10 where the trees had a hard appearance. In the spring of 1943 Block 8 set a normal crop of fruit but there was practically no fruit set in Block 10. Due to the lack of crop ber both blocks had equally heavy infestastrain the trees in the latter plot were in a more vigorous condition in the fall of 1943 than during the previous year and by Decemtions. It is realized that one such observation is not conclusive but from observations made in other groves the indications are that the type of growth and climatic conditions have more influence on the occurrence of winter infestations than any spray applied during the spring. There was evidence, however, that the immediate infestation was heavier following a spray containing compounds of zinc or copper than where those materials were omitted. For the past 12 years the writer has used copper compounds in experimental program sprays, and zinc compounds have been used for nine years. In comparing insect and mite populations on sprayed and unsprayed plots it has been found that on an average purple mite infestations were heavier on the sprayed plot than on the checks. Also, where the sprays contained materials toxic to the mites the reinfestation occurred sooner in plots where those materials were omitted, although the initial control in all plots appeared to be equal. Sulfur sprays have been equally effective in upsetting the natural balance of control. Reinfestations of purple mites as well as rust mites have commonly been more severe following a sulfur spray than adjacent plots where no spray of any kind had been applied within the year. In regard to purple mite infestations following various spray combinations, the data in table 1 demonstrate the increase which occurred following nutritional-sulfur sprays and sulfur sprays compared to the lack of increase in an unsprayed check plot. The most significant difference was the low percentage of leaves infested in the unsprayed check compared to a much higher percentage infested in all of the sprayed plots regardless of the type of spray applied.

It has not been determined just why purple mite infestations develop more rapidly following some of the spray applications except that some of the predaceous mites and insects may be killed by the sulfur contained in most of the sprays for rust mite control. It is also possible that the copper sprays retard the effectiveness of any entomogenous fungi or bacteria which may be present but the work of Holloway et al (4) in California indicates there are other factors involved. He found citrus red mites (same species as purple mites) were more abundant on trees sprayed with a combination of zinc sulfate, copper sulfate,



and hydrated lime than on unsprayed trees, and in another test where he used zinc sulfate and soda ash the results were much the same. He states that the possibility of the fungicidal spray inhibiting fungus control was remote as there was no evidence of a fungus being present in the check plots.

It is conceded that almost any spray, whether of a fungicidal or insecticidal nature, upsets a natural control but it must also be admitted that natural control has not been sufficiently effective to accomplish control before too much damage has been done by the offending pest so artificial control has been necessary. It has not been an economic practice to omit one or two essential parts of a spray program in the hope of escaping an infestation of mites because they are likely to appear regardless of the program followed if weather conditions are favorable for their development.

Since the subject of natural control has been mentioned, it might be well to discuss the effect of rainfall in reducing a purple mite infestation. There seems to be a misconception in the minds of many growers as to the extent of control by rainfall. It can be stated for all practical purposes short of a hurricane that the reduction of a purple mite infestation by rainfall is negligible. Population counts have been made before a hard rainfall and within a day or two afterwards, and there was no significant difference in the density of the population. Even if the mites were washed from the leaves those hatching from the eggs on the leaves and fruit would soon reinfest the trees. There is also the theory that several days of rainy weather will create conditions unfavorable for purple mite development, but there evidently are other conditions necessary to cause their disappearance. During 1943 in one grove under observation there was a steady increase of purple mites during May and June, yet between May 17 and May 31 it rained every day except one and during that period there was a total of 9.1 inches of rain. In one plot where sulfur was used to control the mites the average population increased from 15 mites per leaf on May 10 to 604 mites per leaf by June 15. High temperatures are probably more of a factor in causing mites to disappear in summer than rainy weather. During the summer when the weather is hot mites are very scarce in Florida and Alabama (3), and in California (6) they are not known to occur in the San Joanquin, Sacramento, Coachella, and Imperial Valleys where practically no rains fall during the summer.

Although the purple mite is well known, a description, life history, and seasonal history will be discussed briefly. The eggs are bright red, spherical in shape, and have a small vertical stalk at the top from which guy threads are fastened to the leaf. Eggs are deposited on leaves, usually along the mid-rib, on fruit, and on young twigs. The young six-legged larvae are a pale red color but the color soon becomes a dark red. After the first molt they have 8 legs, typical of spiders. In the process of growing there are 3 molts but 2 or 3 days before the last molt is not active and sometimes the mites in this stage are mistaken for dead ones.

During warm weather the eggs probably hatch in from 4 to 6 days but in cool weather the period is extended to 10 days to 2 weeks or longer. There is an approximate period of one to 3 weeks for the young to reach maturity, the length depending on the temperature and time of year. In Florida the most rapid development of mites appears to be in April, May and early June, but during late June and early July the population usually decreases very rapidly, and during August, September and early October mites are so scarce that they are seldom observed. They again appear during November and may be present throughout the winter and spring months.

Migration is no doubt accomplished by the wind carrying the mites. In California various men in research work have observed the adult mite hanging from a short web, one-half to one inch in length, and this web acts as a sail which is carried by the wind. In some of our experimental work where repeated detailed examinations were being made in treated plots a scattering of adult mites would sometimes be observed on

leaves that had been practically free of any stage of mites for the past 3 or 4 weeks which indicated that the mites had migrated from nearby groves.

Injury

The injury is manifested on the leaf by a pale color which at first has a stippled appearance, and as the feeding becomes more general the leaf takes on a greenish-gray appearance. If the injury is severe the leaf becomes a dull, lifeless gray color and never regains the deep green luster typical of a normal leaf. Injured twigs have much the same appearance as the leaves; young fruit sometimes becomes quite gray from mite injury but as a rule it seems to color normally in the fall. Following a spring infestation there was some indication that Hamlin oranges were marked while they were small and the injury resembled early rust mite injury.

The writer has not been able to measure the injury caused by mites on the spring flush of growth. It can be assumed that leaves cannot function normally if they are lacking in a certain amount of chlorophyll, but no drop of new leaves has been observed following heavy spring infestations on the young growth. However, the injury caused by infestations during the fall and winter months has resulted in a heavy leaf drop in many groves. The leaf drop is usually associated with dry weather or following a dry wind. As stated previously in this paper, the purple mite prefers young growth so the leaves and twigs of the summer and fall growth have been the most heavily infested during the winter months, and it was that growth which was most affected. Leaves on individual twigs died and dropped, and as a rule if the injury occurred in November or December the twigs also died. Quite often the leaf drop was on the windward side of the tree and occasionally such a leaf drop has occurred in groves that have had no recent mite infestation, but it has been observed that leaf drop was more severe where purple mites were present. Quayl (6) describes the same type of injury in California as being caused by the citrus red mite (purple mite) and dry winds. This particular type of injury is sometimes called mesophyll collapse which, according to the plant pathologists, is caused by the leaf losing water faster than the root system can supply it with the result that the mesophyll cells collapse and the leaf dies. In regard to the part purple mite injury has to do with mesophyll collapse, the twig injury probably is as much, if not more, responsible in causing such a condition than leaf injury. During the cool months mites are often more abundant on the young twigs (wood) than on the leaves and the favorite feeding area is at the axil of the leaf.

For the past 6 years it has been felt by a limited number of people who were in close touch with the work that purple mite injury was at least partly responsible for mesophyll collapse since the condition seldom occurred in groves free of mite injury. Some observations were made where parts of certain groves had been sprayed in the fall with an oil emulsion for scale control and no mesophyll collapse developed, but in the unsprayed portion of some of those groves mesophyll collapse did develop along with or following purple mite infestation. During the winter season of 1943-44 the severe leaf drop coupled with the heavy purple mite infestations left little doubt in the minds of most growers that purple mite injury was in part responsible for the heavy leaf drop. The correlation of leaf drop to mite population was demonstrated in some experimental plots this past season. On December 8 an application of DN-Sulfur dust was made with the Master Fan duster on one-half of a grove, and on December 9 the remainder of the grove was dusted with the same kind of dust but the application was made with a single outlet duster of the type commonly used in Florida. Very good control was obtained in the portion of the grove dusted with the Master Fan duster, but due to poor coverage the control was not so satisfactory where the single outlet duster was used. By February 1 that part of the grove dusted with the single outlet duster was again heavily infested and a leaf drop was noticeable and by February 9, or one week later, 82 percent of the trees had a medium to heavy leaf drop. In the portion of the grove where good control was obtained only 5 percent of the leaves were found to be infested and only 15 percent of the trees showed a medium leaf drop. It was interesting to note that the leaf drop could be detected to the row where a heavy infestation existed (table 2.)

Results of experimental work and observations made by competent field men and growers indicated that purple mite injury is of real consequence. The severity of infestations will no doubt vary from year to year which makes it necessary for grove operators to include purple mites in the list along with other insects and mites when inspections of the groves are made. It is especially important to inspect for mites between September and May, and if only an occasional mite is found in October or early November it is an indication that one will have a potential infestation before spring if weather conditions are favorable. During the winter months if mites are present they are more likely to be found on the south side and the tops of the trees. Also, during that period of the year twigs as well as leaves of the summer and fall flush of growth should be inspected.

TABLE 1. Purple Mite Infestations Following Dormant Sprays.

Materials and Dilutions	% Leaves infested 2 months after spray	
Sprays applied January 31, 1944	Cultivated plots	Non-cultivated plots
Neutral copper 1, Zinc sulfate 3, Lime 1½, Wettable sulfur 10-100	45	37
Lime-sulfur 2 gals., Wettable sulfur 5-100	46	33
Zinc sulfate 3, Lime-sulfur 2 gals., Wettable sulfur 5-100	50	46
Lime-sulfur 2 gals., Wettable sulfur 5-100	49	43
Zinc sulfate 3, Lime-sulfur 2 gals., Wettable sulfur 5-100	58	31
Unsprayed check	5	

Control

In the purple mite work at the Citrus Experiment Station many materials were tested in a preliminary way but only a few of the more promising ones have been tried extensively. Lime-sulfur has been used for years for mite control but in recent years it has not been satisfactory. Sometimes a dormant application of lime-sulfur 2-100 plus wettable sulfur 10-100 seemed to hold the mites in check but when weather conditions were favorable for mite development it was of little value and of the 5 materials tested extensively it was the least effective.

An oil emulsion spray has been as effective and economical as any of the materials tested, especially when it is considered that it also reduced infestations of scales, whiteflies, and to a certain extent rust mites.

TABLE 2. Leaf Drop Following Reinfestation of Purple Mites on Orange Trees. Dust Applied Dec. 8 and 9, 1943. DN-Sulfur Dust.

Dusting Equipment	% Leaves Infested		% of Trees with Varying Degrees of Leaf Drop					
			February 1			February 9		
	Jan. 11	Feb. 1	Light	Med.	Heavy	Light	Med.	Heavy
Master Fan Duster	1	5	100	0	0	85	15	0
Single Outlet Duster	28	70	42	51	7	18	35	47
Untreated Check	57	90	31	43	26	No Record		

An oil emulsion spray at a dilution of .75 percent actual oil has given as good initial control as stronger concentrations but the period of control has been somewhat longer where the oil was used at a cencentration of 1 to 1.25 percent actual oil.

A dormant pregrowth (Febraury or March) oil spray has been effective until the summer oil spray except in a few instances where reinfestations occurred by late May. When reinfestations did occur it was felt that the migration of mites from adjacent groves reinfested the grove because no mites were observed 6 weeks after th oil application and the second infestation increased very rapidly.

Spring oil sprays (March, April and May) have also been effective until the summer oil spray in June or July. In recent years it has not been a common practice to apply an oil spray during the spring period because of the danger of injuring young foliage and fruit. A combination neutral copper-oil emulsion spray, 1 percent actual oil, has resulted in satisfactory purple mite control but that combination has not been generally recommended because of possible spray injury on fruit. During the early twenties (8) bordeaux-oil was recommended for melanose and scale control but too much injury to fruit resulted from that spray so its use was more or less discontinued. The now annual occurrence of purple mite infestations in the spring and the difficulty in controlling scale insects with one spray has again created a demand for such a spray. Since 1939 a limited number of experiments have been conducted in which a spring application of a neutral copper-oil, 1 percent actual oil, was included. Injury on oranges developed in some plots in 2 of the 5 years the combination was used, and only a slight amount of injury on grapefruit developed in one of these years. In each instance where injury developed on oranges the copper-oil application was made when a majority of the fruit was between one-half and one and one-fourth inches in diameter. No injury occurred during the same years where applications were made before the fruit reached one-half inch in size.

In general an oil spray, like any other spray, has its limitations. It is a well-known fact that an oil spray should not be applied when the trees are suffering for moisture or during cold weather. Nevertheless, it has been found in the experimental work that if the trees were in a vigorous condition and they were not suffering for moisture, the ill effects of low temperatures following an oil application were not so pronounced as where the trees were weak. A fall oil spray may also retard the coloring of early fruit. There are two important factors to be considered in that connection: (1) when the weather was warm and continued warm, fruit sprayed before it had colored naturally was difficult to color in the coloring room; (2) if the grove received an oil spray during the summer after June 15 and received another in the fall before the fruit had colored, the coloring process was definitely retarded.

Dinitro-o-cyclohexyl phenol, commonly called DN, has proved a satisfactory material for purple mite control. The DN-Dry Mix (40 percent dinitro-o-cyclohexyl phenol) which is now on the market in Florida has given results equal to an oil emulsion spray except when rainfall occurred within 2 or 3 days after an application. It is used at the

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rate of 2/3 pound (10 ounces) per 100 gallons of water but it has not caused burn on mature foliage when used at the rate of 3/4 pound per 100 gallons. In practically all tests where various amounts were used, 2/3 pound was as effective as larger amounts. DN was most effective in a slightly acid solution and least effective in an alkaline solution. DN-Dry Mix alone when mixed in water was not so effective because there is not enough wetting agent in it to wet the foliage, but when mixed with wettable sulfur excellent results were obtained. Some other wetting agents besides wettable sulfur proved satisfactory but it was found that DN sprays without sulfur did not result in as long a period of rust mite control as where sulfur was included in the spray. Wettable sulfur has been used not only for its value for rust mite control but because a mixture of the average wettable sulfur and water is slightly acid.

The average period of purple mite control with DN-wettable sulfur sprays varied with the season of the year and the degree of infestation at the time of application. Sprays applied in late April or early May controlled mites from 6 to 8 weeks or for about the same period obtained with an oil emulsion. Sprays applied in November and early December resulted in control over a period of from 3 to 5 months in experimental plots but in some commercial operations the control is reported to have been satisfactory for as long as 6 months when the spray was applied during the dormant season. As a rule a dormant application of DN-wettable sulfur or an oil spray has been effective until the time for the melanose spray.

DN-Dry Mix is compatible with the neutral coppers, and combinations of neutral copper, DN and wettable sulfur have proved satisfactory. The initial kill from the DN in this combination has been the same as where the DN-wettable sulfur was used but in the spring period the reinfestation has occurred sooner where copper was included in the spray than where it was omitted; nevertheless, on an average the DN in the copper-wettable sulfur spray has controlled the mites until time for the summer oil application. The exceptional failure of the DN in the copper-wettable sulfur spray to control the mites was in heavily infested groves which received the average type of melanose application which was not sufficiently thorough to control a heavy infestation. During April and May there is a higher percentage of eggs on the under surface of the leaves than during the winter months which necessitates a rather thorough coverage if lasting control is to be expected. Light infestations have been controlled where DN was added to the copper-wettable sulfur spray by the usual melanose type of coverage.

Another combination spray in which DN is desirable is the dormant nutritional zinc-sulfur spray, but since DN is not so effec-

(Continued on page 12)

More than 11,000,000 men are in uniform. There are nearly 5,000,000 American fighting men overseas. Food rationing is still in effect. The war is not over.

The surrender of Germany will not necessarily mean an immediate easing of the food situation. This year's crop of Florida citrus still has a war job to do.

Even with complete victory, there will be need for vast quantities of food. Demobilization will not occur for some months thereafter. Thousands of people in liberated countries will have to be fed. This means that next season's crop of Florida citrus will probably have a postwar job to do.

This is why your current fall fertilizer program is of vital importance. It will be an essential factor in determining the quantity and quality of next season's yield. Be certain that your crop gets the right kind of plant foods.

Gulf Fertilizers are keyed to your soil. The Gulf Field Representative in your territory — backed by Gulf's more than 40 years' experience in analyzing the needs of Florida soils — is at your service. He can help you!

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Tampa and Port Everglades, Florida

NITROGEN PHOSPHORUS POTASH CALCIUM COPPER IRON MAGNESIUM MANGANESE SULPHUR ZINC

Eddie Gives Reactions Gained

Seems like a long time now since the Boss said to me last April, "Come on Eddie, it's time you learned something about the art of growing citrus and the help that our fertilizers are giving our customers all over the citrus growing area of the state."

And when he said to me last month, "This is the last trip of this sort you are going to make for a while," we felt a little bit let down. But just a day or two ago the Boss came to my desk, where this time he happened to find me actually immersed in my work, and really dropped a bomb shell in my lap when he said: "I've got to be away for several days and The Citrus Industry has to have the copy for our advertisement before I get back — so you fix it up," then without further comment turned and walked out the front door.

There have been times when it has occurred to me that I knew just about as much about this business as anyone else connected with it but that wsa when we could sit back on our haunches and criticise someone slse without having to try to remedy anything we thought might not be just the way we would do it. Just between us I don't mind telling you that being left all by myself to prepare our copy for the October issue of The Citrus Industry just isn't altogether in my line, but since I like my job and want to hang on to it I'll make a stab at setting down my reactions in the hope that the boss won't be too disappointed when he sees them in print.

You may recollect that in the May issue we told of our trip to Polk County, then in the June number we visited Hillsborough and Pasco groves. In July the Boss sent me all by myself to look at Hardee county grove properties, then in the August issue we told of our trip down into Lee county and last month we wound up our journeys with a trip through the Indian River section.

Those who know tell us that these areas cover a very considerable portion of the major citrus growing areas of the state, and everywhere we went we heard many of the largest citrus producers saying kind things about the merit of our Superior Extra-Value Brands of Fertilizers and the service which our field men are giving them.

We never heard one of these complimentary comments without sort of letting our chest swell out a little bit. We realize that we are

Superior Fertil

Phone Y-1623

G. D. Sloan

Factory and Office East Broadway

NITROGEN PHOSPHORUS POTASH CALCIUM COPPER IRON MAGNESIUM MANGANESE SULPHUR ZINC

NITROGEN PHOSPHORUS POTASH CALCIUM COPPER IRON MAGNESIUM MANGANESE SULPHUR ZINC

ned On Recent Trips--

a very minor part of the Superior Fertilizer Company organization, but we did and do get a heap of satisfaction out of knowing how well our customers regard the firm we happen to work for.

The Boss porbably wouldn't let me say it if he were going to see this copy before it was printed but I got a kick, too, out of the manner in which our customers listened to his answers to questions they asked him about the treatment of soils and trees and crops. It was more than apparent to me that folks who knew him, and it seemed nearly everyone did, had a very high regard for his opinon in such matters.

Another thing that impressed me no end was the uniformly fine condition of the groves which had been fertilized with our Extra-Value Brands and cared for under the direction of our representatives wherever we went.

So I have come to the conclusion that the inclusion of these minor elements which we have been talking about for so long is a mighty sound policy. If it were not, there wouldn't be so many people ready to praise the job that we are doing for them, and so many more apparently anxious to turn their business over to us when it will be possible for us to supply all of them.

As you may have gathered the visiting of these grove properties over the state which are serviced by our goods and by our company has definitely sold me on the exceptional effectiveness of our Fertilizers and Our Service.

If there are any citrus growers in Florida who aren't as yet fully and completely sold on the job we are doing we would suggest that they go through the list of those whom we have listed during the past five months and do the same thing we have done — visit these groves and talk to their owners and find out directly from them what they think of the job which Superior's Extra-Value Brands and Superior Service is doing for them.

If many growers followed this advice it might make it too easy for our salesmen, because we believe that nothing will sell our products better than this plan — but if you want to know for sure just how good Superior Fertilizers and Superior Service are there's no better way to find out.

EDDIE

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adway At 47th Street, Tampa, Florida

NITROGEN PHOSPHORUS POTASH CALCIUM COPPER IRON MAGNESIUM MANGANESE SULPHUR ZINC

PROGRESS REPORT ON PURPLE MITE AND ITS CONTROL

(Continued from page 9)

ive in a highly alkaline spray it has been necessary to use less lime than is ordinarly recommended. The nutritional spray ecommended for general use is either zinc ulfate 3 pounds, hydrated lime 1½ pounds, nd wettable sulfur 8 to 10 pounds per 100 allons; or zinc sulfate 3 pounds, lime-sulfur 2 gallons, and wettable sulfur 6 pounds per 00 gallons. A solution containing 3 pounds f zinc sulfate and 1½ pounds of hydrated me per 100 gallons of water has a pH of pproximately 11.5. Where DN was combined in a spray containing zinc sulfate nd hydrated lime at the ratio of 2 to 1, he intitial kill was reduced and the reinfestation was much more rapid than where the zinc and lime were omitted from the spray mixture. In sprays where the hydrated lime was reduced to one-third as much lime as zinc sulfate, the DN was much more effective and the period of control was extended. The results in Table 3 show the control obtained with zinc sprays containing DN and various amounts of lime. The results in that experiment were typical of control obtained in other experiments of the same nature. The ratio of 3 to 1 of zinc sulfate to hydrated lime has a pH of approximately 7.4. Since a pH of 7.0 is neutral there is a very narrow working margin, especially under field conditions, between a pH of 7.4 and an acid solution, (Figure 1.) A slight error in over-weighing the lime as little as 0.2 of a pound per 100 gallons, would increase the pH to 10.5 which would affect the toxicity of the DN and an error in under weighing of 0.2 of a pound would result in an acid solution having a pH of 6.8 which is near the point where the zinc would become soluble and cause injury.

When the trees are dormant there is not much danger of burn from a spray containing zinc sulfate and hydrated lime at the ratio of 3 to 1 but very careful weighing should be practiced if that ratio is used during the melanose spray when young foliage and fruit are present. In any case if the above ratio of 3 to 1 of zinc sulfate to lime is used certain precautions should be observed. Use scales that weigh correctly, weigh all materials carefully, and determine whether the water being used is acid or alkaline. The water from some lakes is very acid and if that type of water is used it may lower the pH enough to cause the zinc to become soluble which would likely injure the fruit and foliage. It is well to follow a certain procedure in mixing spray materials where DN is to be used in zinc-lime spray. The zinc sulfate should be dissolved in the tank then add the lime, then the wettable sulfur and when the tank is at least half full, add the DN. If the DN and lime are added first the toxic effect of the DN will be destroyed. Upon investigateion of several complaints that DN was not effecting control, it was found that one operator was adding the DN and lime first and another operator was dumping the materials into the tank just as he hapuened to come to them.

Manganese sulfate is usually included in the dormant nutritional spray in areas where the pH of the soil is 6.0 or higher (Camp (2)). If DN is to be used in a combination spray containing zinc sulfate and manganese sulfate, a different ratio of the amount of metals to the amount of lime should be used than with zinc sulfate and lime. The amount of lime required to neutralize manganese sulfate is less than that required to neutralize the same amount of zinc sulfate and a ratio of 4 to 1 of equal amounts of zinc sulfate and manganese sulfate to lime is recommended when DN is to be used in such a spray. The addition of a neutral copper, DN, and wettable sulfur does not affect the pH to any extent in the nutritional spray, so a typical east coast dormant nutritional-purple mite-rust-mite spray would be something like the following formula: Neutral copper 2, zinc sulfate 3, manganses sulfate 3, hydrated lime 1½, wettable sulfur 10, and DN 2/3 (10 ounces) per 100 gallons.

As stated above, DN in alkaline solutions has not been so effective as when used alone with wettable sulfur but the addition of DN in dormant nutritional sprays where the zinc and lime were used at a ratio of 3 to 1 resulted in periods of control for 4 to 5 months. During this past winter of 1943-44 commercial applications made between late December to February 1 were effective at least until May 1 while on some other groves a reinfestation was occurring by April 1. The thoroughness of application and density of population have been contributing factors in determining the period of control.

Lime-sulfur is ordinarily recommended in the dormant spray to neutralize zinc sulfate and many inquiries have been received as to why lime-sulfur cannot be used instead of hydrated lime if DN is to be used. In the experimental work lime-sulfur has been used to neutralize the zinc sulfate in a spray containing DN, but, as shown in Figure 1, a slight error in under-measuring the lime-sulfur would result in a very acid solution or a rather high alkaline solution if there was an over-measurement. For instance, 0.9 gallon is sufficient to neutralize 3 pounds of zinc sulfate per 100 gallons but if as little as 0.8 gallons were used, the solution would have an approximate pH of 4.2 and if 1 gallon was used the solution would have a pH of 9.0. Furthermore, the toxicity of the lime-sulfur is destroyed by the action of the zinc sulfate if only enough is used to neutralize the zinc so there is no object in using it in combination with DN.

In general DN has been found to be most effective with wettable sulfur, next in effectiveness is a combination neutral copper-wettable sulfur spray and least effective when combined with zinc sulfate, hydrated lime, and wettable sulfur although effective enough to warrant the use of that combination whenever necessary, especially during the dormant period. It has been very effective in controlling six-spotted mites in any of the spray combinations that have been tested. DN has certain advantages over an oil emulsion spray inasmuch as it has not retarded the coloring of fruit and it was applied to trees suffering from drouth without any apparent shock.

DN should not be sprayed on very succulent foliage. Almost without exception sprays containing this material injured foliage that had not reached full size and hardened to the extent that there was some firmness of the leaves. No commercial injury has been observed when DN was included in copper sprays for melanose control but injury did devlop on fruit and foliage following a spray applied when the temperature was 92 degrees F. Rainfall occurring within 1 or 3 days after applications materially reduced the period of control. A combination of oil and DN should never be sprayed on citrus trees as it will cause severe burn and leaf drop.

Dinitro-ortho-cresol has been tested in numerous experiments but the results with that material have never been sufficiently satisfactory to warrant recommending it.

(Continued on page 14)

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The success of the Swift Program for Controlled Tree Feeding depends on properly trained tree experts, seasoned manufacturing men, good facilities and the highest quality materials. We will not deviate! You'll get the REAL thing when we tell you we can put your groves under the Swift Program.

Until then, watch the progress of groves operated under this program. Convince yourself it is the program that will help you make your groves more productive and more profitable.

Swift & Company, Plant Food Division
Bartow, Florida

PROGRESS REPORT ON PURPLE MITE AND ITS CONTROL

(Continued from page 12)

Selocide, a selenium compound, has proved satisfactory when used at 1 to 800 in a combination with lime-sulfur and wettable sulfur. The use of this material has been limited because the manufacturer does not recommend its use in sprays containing zinc or copper compounds. There has also been some question raised as to the advisability of spraying it on trees with mature fruit still on them.

DN Dusts

A limited number of tests have been conducted with DN-sulfur dusts for purple mite control. In California, Boyce et al (1) found that dusts containing 1 percent dinitro-o-cyclohexyl phenol were very effective in controlling the citrus red mite, and results from a limited number of tests conducted by the Florida Citrus Experiment Station indicate that if a sufficiently thorough coverage is obtained, the use of such dust would be practical here. In February 1943, trees 6 or 7 feet high were dusted with several different types of DN dust, each material containing 1 percent dinitro-o-cyclohexyl phenol. The trees were dusted on 2 sides and about 1 pound of dust was used per tree. These trees were small enough so that a rather complete coverage was obtaind and the period of control was as long as that obtained with a DN-wettable spray applied the same day in another portion of the grove. Later in the spring some larger trees were dusted but the control was not so satisfactory because of poor coverage obtained with the single outlet duster which is the type commonly used in Florida.

During the past winter experiments were continued with DN-sulfur dusts but the applications were made with the type of duster developed in California for applying DN dusts for mite control. Briefly, the duster is equipped with a large multivane fan or blower capable of discharging between 18,000 and 20,000 cubic feet of air per minute. The dust-laden air passes through a tunnel which extends to 2 narrow fishtail outlets. The outlets in the machine used at the Station were 4½ feet high but on the standard machine used for dusting citrus they are 6 feet high. The outlets are equipped with movable fins about 3 inches wide. These fins move back and forth with the result that the moving air turns the leaves in such a way that a more complete coverage of dust is obtained than is possible with the single or double outlet dusters.

DN-sulfur dusts containing 1 percent dinitro-o-cyclohexyl phenol, supplied during the dormant season with the above described duster, resulted in effective control on medium-sized orange trees for 10 to 12 weeks or until time for the melanose spray in April. The most satisfactory control was obtained while the air was calm and there was dew on the leaves. Approximately 1.5 to 1.7 pounds of dust were used per tree. It is necessary for the dust or spray to come in contact with the purple mite to kill it so a more thorough coverage is necessary than for rust mite control. In order to compare purple mite control with DN-sulfur dust where the 2 types of dusters were used, different portions of the same grove were dusted on December 8 and 9, respectively. At the time the dust was applied there was a medium infestation of mites in the portion of the grove where the records were taken. As shown in Table 1, the intitial control was much better and the period of control longer where the dust was applied with the California-type duster than with the single outlet duster. In all fairness to the application made by the single outlet type of duster, more satisfactory control has been obtained in other experiments as well as in commercial operations than was accomplished in that experiment, but the fact remains that at best satisfactory coverage can hardly be obtained with the single outlet duster unless very careful work is done. In some commercial operations the control with DN-sulfur dust applied with a single outlet duster was sufficiently satisfactory to warrant its use.

The California type duster could be used in the average budded grove but it is doubtful if it would do satisfactory work in high seedling groves. The tops of medium-sized trees were not covered so completely as was desired but if the duster had been equipped with the 6-foot fishtails a more complete coverage of tree tops could have been accomplished. It is the opinion of the writer that a duster of this type could be used to advantage by large grove operators for applying DN-sulfur dusts and sulfur dusts.

Fall and Early Winter Seasonal Programs

At the present time only suggestions can be made for a complete yearly program for purple mite control but it appears that at least 2 treatments, excluding the summer oil, will be necessary for control throughout the year. Since the injury in the fall and winter is liable to cause leaf drop, treatments in those periods are needed. It is usually necessary at some time during the fall or early winter months to apply sulfur for rust mite control and when such a spray is necessary a DN-wettable sulfur combination can be used. If a dust is desired rather than a spray, a DN-sulfur dust can be used which will check the purple mite infestation if both sides of the trees are dusted and careful work is done. The dust application applies to the whole dormant period. If the spray or dust is to be applied in early September high temperatures should be kept in mind since injury is likely to develop if the temperture is likely to reach 92 degrees or over. An oil spray is also practical and very effective during September and Octobter if the groves are not dry and the fruit is not to be picked before mid-December as the spray may retard coloring.

TABLE 3. The Effects of Varying Amounts of Lime on the Toxicity of DN-Dry Mix for Purple Mite Control.

Materials and Dilutions Applied May 8, 1942	Average number living mites per leaf	
	May 15	June 6
DN ⅔, Neutral Copper, Wettable sulfur 6-100	.03	0.5
DN ⅔, Neutral Copper 2, Zinc sulfate 3, Lime 1, Wettable Sulfur, 6-100	.13	0.9
DN ⅔, Neutral Copper 2, Zinc sulfate 3, Lime 1.2, Wettable sulfur 6-100	.17	1.5
DN ⅔, Neutral Copper 2, Zinc sulfate 3, Lime 1.5, Wettable sulfur 6-100	1.75	12.8

Dormant Nutritional Spraying

This spray is usually applied between January 10 and up until the spring flush of growth starts. If only an occasional mite is observed in the grove when this spray is applied it would be well to include DN. A satisfactory spray would be zinc sulfate 3 pounds, fresh hydrated lime 1 pound, wettable sulfur 10 pounds, and DN 2-3 pound (10 counces) per 100 gallons of water. If the spring growth starts be-

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fore the dormant sprays are completed the DN should be omitted from the spray.

Spring or Melanose Sprays

If mites were not controlled late in the dormant period, DN can be added to the neutral copper-wettable sulfur spray or to wettable sulfur if copper is not to be used. A copper-oil emulsion spray can be used but the grower should keep in mind the chance of fruit burn, especially on oranges. The use of DN should be discontinued when the temperature reaches 92 degrees F.

Summer Spray

Occasionally infestations extend into mid-July, especially in groves that have been free of mites during the spring; if such is the case, the summer oil should be applied any time after May 14 on grapefruit and June 1 on oranges unless there is a very late bloom and then June 15 is preferred for oranges because of possibilities of marking the young fruit with the oil spray.

STUDIES ON THE USE OF FORMALDEHYDE AND SODIUM ORTHO-PHENYLPHENATE MIXTURES IN THE CONTROL OF DECAY IN CITRUS FRUITS

(Continued from Page 3)

sirable to determine whether Dowicide A plus formaldehyde could be applied with the wax-emulsion usually employed in processing fruit. If so, the disinfectant could be applied without further complicating packing house procedures. Accordingly four laboratory tests were conducted in which an aqueous solution of Dowicide A plus formaldehyde was compared with wax emulsions containing these compounds. The results of all four experiments indicated that these compounds could be applied in wax emulsions as well as in aqueous solutions. With this information in hand, the next experiments were conducted in commercial packing houses.

In these commercial tests a control sample (usually a crate of fruit) was first collected from the grading belt in the packing house. As soon as this was done, the wax tank was emptied and recharged with a wax emulsion containing Dowicide A and formaldehyde. As soon as operations were resumed, the treated sample was collected in the same manner as was done with the control. Both crates were held for one week at 50° F. and for one week at 70°. Tests were conducted in two packing houses; one in which the wax emulsion was applied in the form of a light mist, using fog nozzles; and another in which the emulsion was applied as a warm, flood spray. Dowicide A was used at 3 percent concentration in the former and at 1¼ percent in the latter. Application in each case was made on wet fruit just before it went into the drier. Two experiments were conducted in each packing house and the results appear in table 3.

In the first experiment in each house, the treated lots showed no rind injury. That reported for the control in one instance (2.1 percent) may have been the result of mechanical injury. In the second test the treated fruits in the first packing house showed 7.4 percent rind injury. In the second packing house where the formaldehyde-Dowicide A mixture was applied as a mist, the percent of rind injury in the second test was higher, i.e., 13.6 percent.

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and every Grower in Florida has a right to be proud of the part he has played in providing needed food and fruit for our armed forces — but the job isn't finished. Keep on helping and producing with the aid of

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Reports of Lyons Field Men . . .

NORTH CENTRAL FLORIDA
V. E. (Val) Bourland

We are now just entering the shipping season and there is a general feeling of optimism that we will have a most successful operation. While most growers do not expect to see fruit sell at prices that prevailed during the past season, they do anticipate very good prices that will result in a profit for the years' work. It is rather difficult to make a very accurate estimate of the fruit crop now on the trees. In some sections we have more fruit than last year, in others there is less fruit, and of course there are the young trees just coming into production that must be taken into consideration. Cover crops have been cut and the fall application of fertilizer will be somewhat earlier than in former years. Vegetable crops are being planted in the Winter Garden area and about the same acreage as last year will be cultivated.

WEST CENTRAL FLORIDA
E. A. (Mac) McCartney

Conditions are good in this territory. The groves are in fine shape, although the fruit crop is spotty. In individual groves you will find trees with very light, if any fruit at all, and the other trees will have a fair crop. This makes it very hard to estimate the number of boxes. We have had rains in most sections but there are still some localities that are very dry. Scale has given most growers considerable trouble except where the oil application was applied early in the summer. The fall fertilizer application will start about October 15. Most growers are quite optimistic about fruit prices for the coming season. In any event, we are all hopeful and feel confident that when the season is over that we will be able to say that all operations were successful.

POLK COUNTY
J. M. (Jim) Sample

Several packing houses in this section have started moving grapefruit and others are planning to get under way as soon as is possible. In fact, others would be in operation at the present time but have had difficulty in getting their repairs completely finished. Fruit prices are good on early fruit but there is very much speculation on the part of the buyers, and this of course means that only fruit that can be moved within a short period of time is being bought. Growers in this section are starting with their fall application of fertilizer and this will be over by December 1. We are still having some trouble with scale insects and some groves will be sprayed with oil just as soon as the early fruit has been moved. We are still urging growers to keep a close check on rust mites.

POLK COUNTY
J. B. (Jeff) Britt

Most vacations are over and everyone is ready to start a busy winter season. Generally speaking, most groves in this section are looking good and fruit is sizing up extremely well. Our rains have been copious during the past month and this has been of great value to not only the trees but is largely responsible for the nice sizes that we are getting on our fruit. Packing house men are very busy getting their labor lined up for the approaching fruit season and apparently this situation will be somewhat relieved over last spring. Many packing houses have put in labor saving devices that will be of material help. In this connection many growers have also taken advantage of labor saving devices and have done an excellent job of operating their groves this year.

SOUTHWEST FLORIDA
F. W. (Felton) Scott

Rains throughout this section have been very spotty and as a result we still have some sections where groves are suffering badly from dry weather. Due to the early dry weather that we had in the spring scale developed very rapidly and have caused considerable damage. The fruit crop in this section will be somewhat lighter this year than last because of the heavy droppage of young fruit during the prolonged drought in the spring. Vegetable growers are well under way with their fall plantings and apparently we will have a normal acreage of the usual crops, with tomatoes, of course, being the most predominant crop planted.

HILLSBOROUGH & PINELLAS COUNTIES
C. S. (Charlie) Little

Most groves in this section are pretty dry. This is especially true of some sections in Pinellas county. We have never seen rains as spotty as they have been this summer, and if it wasn't for the old saying, "It rains on the unjust as well as on the just," then we would almost believe that there were some sections in my territory where the people just wouldn't pay the preacher. Some grapefruit has been moved from the Clearwater section and it looks like that heavy shipments will be started at an early date. Oranges are just on the verge of passing. Scale insects have been very hard to control this summer and some growers have sprayed as many as three times with oil. Fruit buyers are staying under cover. In fact, we haven't seen any of them scouting around for fruit.

SOUTH CENTRAL FLORIDA
H. C. (Cullie) Collins

Many growers in the Wauchula section are deeply concerned over the $2.10 cucumber ceiling for the month of October, a month in which they generally give five or six dollars per bushel for their early pickings. Growers met Sept. 15 with Mr. LaMont Graw of the Vegetable Committee to formulate protests to the OPA. They claim that the OPA failed to announce the ceiling price fifteen days before planting season as required, and they are attempting to have the ceiling prices raised. Citrus buyers are becoming increasingly active on the Hamlin orange and early grapefruit crops. Orange prices in this section for fruit that will pass test within next thirty days are from $1.75 to $2.00 per box on the tree. Citrus trees are looking good throughout this territory.

ADVERTISEMENT—LYONS FERTILIZER COMPANY

Seems as if most everybody has a different idea about what Florida's crop of citrus is goin' to amount to this season. Some folks seem to figure that we'll have a heap more fruit than we had last year, while other folks dope it out that we won't have any more than we had last year. But everyone is in plumb agreement about the fact fact that there will be more tangerines than they was last year — and that this season's fruit has got more of this here much talked about quality in it than any crop we've had for a long, long time. What with plenty of fruit down here and with the flavor being tops and with our northern consumers havin' their pockets bulgin' with money and a better idea of what good citrus fruit should taste like, looks to us as if we're just before havin' a mighty good season.

Believe it or not, there's a heap of truth in the old sayin' that even an old dog can learn new tricks if he's a mind to try. Hain't been more'n five or six years ago since I took a trip through the citrus section of Florida about this season of the year and then I saw trees that looked yellow, hard and generally in a tough lookin' condition. Well, last week I had a chance to cover about the same area and I was amazed at the improvement not only in a grove here and there but in nearly all of them. Bein' sort of inquisitive I asked a guy who knows the answers and he said the change was due entirely to the general use of secondary plant foods with magnesium, calcium, copper, manganese and zinc bein' the chief foods. The Xperiment Station and the commercial fertilizer companies have been boostin' this program and it sure has paid dividends to the growers — and to the consumers.

'Smatter of fact the whole business of growing things has shown a lot of change in the past few years. Take the vegetable growin' business. Land that a few years ago was just figgered no good for anything 'cept growin' palmettos is now growin' some of the finest vegetable crops in the world. This all come about by studies which research workers, the growers and the commercial fertilizer companies made. So that now we are puttin' the deficient materials into the soil which were needed and makin' that soil produce food for our armies and navies and the people all over the world.

Used to be that the cow business in Florida was just a matter of turning a cow out to range for itself and hoping that eventually the critter would get fat enough to make a sorry kind of beef. Today all over the state pastures are being planted to better food grasses and elements are added to the soil that make fast growin', healthy pastures for the finely bred cattle that now populate our ranges. Copper is one of the elements which a lot of cattlemen are finding good not only for their pastures but for their cattle. 'Course the land used has to be fitted for the work you put it to, but fertilizin' pastures is definitely in the cards these days.

Canning and drying were words that were used a lot in days gone by but now we're so high-toned we call all such methods of treating fruits and vegetables as processin'. But no matter what we call it this treatment of our crops is goin' to help a heap when competition gets more keen and stocks accumulate too fast. It is fast reachin' a point where before long we'll probably be using some method of processin' our crops at home and then marketin' 'em cooperatively to the consumer. Human ingenuity is a great thing. This same ingenuity is goin' to solve a lot of problems after the war.

UNCLE BILL.

TUDIES ON THE USE OF FORMALDEHYDE AND SODIUM ORTHO-PHENYLPHENATE MIXTURES IN THE CONTROL OF DECAY IN CITRUS FRUITS

(Continued from page 15)

his is also higher than was usually found n the laboratory tests, suggesting that formaldehyde is not so effective in preventing ind injury when applied as a mist rather han as a flood spray or in a dip tank. urthermore the Dowicide A mixture was ot at all effective in reducing decay when pplied as a mist. In these experiments, hen 1½ percent Dowicide A was applied s a flood spray, the decay was reduced rom 24.5 percent to 0 percent in one test nd from 43.1 percent to 11.8 in the second. On the other hand, when 3 percent owicide A was applied as a mist on wet ruit, the figures for decay were 7.9 percent or the untreated and 8.9 percent for the reated fruit in one test. Decay in the econd test was 13.8 percent and 14.6 perent for the untreated and treated lots, espectively. Tests were conducted in five ther packing houses and the results were uite similar.

Discussion

From the results reported it will be een that the addition of formaldehyde olution to Dowicide A considerably reduced he amount of rind injury. The slight mount of injury still appearing after the rotective treatment had been applied may ave been due largely to mechanical injury, often called "box scald," since it is not always possible to distinguish between mechanical and chemical injury. At any ate the rind injury was so slow in developng and so mild in degree that no complaints were registered by the receivers of these hipments.

No rind injury was produced by the formaldehyde itself. This was demonstrated by a number of tests in which oranges were reated with formaldehyde solution alone at he highest mixture concentration, with no esultant injury.

It will be noted that in these experiments he Dowicide A plus formaldehyde was used both in aqueous solutions and in wax emulsions. Several shippers expressed the fear hat these compounds might "break" the wax emulsions. No exhaustive study has been made of this subject, but no difficulty has been encountered with the five or six different types of waxes used. In one instance a wax emulsion containing Dowicide A and formaldehyde has remained stable in the laboratory for four months and is still emulsified at the present writing. When using a wax emulsion, it is advisable to add the Dowicide A and formaldehyde to the water used for diluting the wax rather than to the wax itself.

It should be remembered here that the formaldehyde solution should be added to a solution of Dowicide A. It did not prove effective in reducing rind injury when added to crystals of Dowicide A. The formaldehyde-Dowicide A mixture may be prepared as much as a month in advance of its use without risking any loss of efficiency.

Under commercial conditions the Dowicide A mixture was effective in controlling decay only when applied in a warm, flood spray. When applied by means of fog nozzles, it did not control decay even when the disinfectant was used in concentrations as high as 3 percent. Apparently not enough Dowicide A remains when applied as a mist to fruit that is already wet. It should be borne in mind, too, that any method for decay control requires constant supervision. Proper concentrations of disinfectants must be maintained, and spray nozzles must be kept open.

Summary

1. Sodium ortho-phenyl-phenate (Dowicide A) was found to be one of the most promising new compounds tried for controlling decay in citrus fruits but was objectionable because of injury to rinds of the fruit.

2. The difficulty was practically overcome by adding one part by weight of commercial formaldehyde solution (37 percent strength) to 4.5 parts of Dowicide A.

3. This quantity of formaldehyde by itself caused no apparent injury to the rinds of oranges and lemons.

4. The formaldehyde must be added to an aqueous solution of Dowicide A, and the mixture can be prepared as much as a month in advance.

5. The Dowicide A-formaldehyde mixture was used both in aqueous solutions and in wax emulsions. It is advisable to add the mixture to the water used for diluting the wax rather than to the wax itself. The mixture did not break the emulsions of the five or six waxes used.

6. Under commercial conditions the Dowicide A mixture was effective in controlling decay only when applied as a warm flood spray. Concentrations of Dowicide A recommended are from 1¼ to 2 percent, depending upon the method of application. Applying the mixture as a mist was not effective even when the concentration of Dowicide A was as high as 3 percent.

(Above Paper Presented At Meeting Florida State Horticultural Society)

TABLE 1. Rind injury on lemons produced by treating with Dowicide A, both with and without formaldehyde.

Treatment	Fruits Showing Rind Injury
Water only, 2 minutes at 110° F.	0
2% Dowicide A for 2 minutes at 110° F.	78.0
2% Dowicide A + formaldehyde solution (5 to 1) for 2 minutes at 110° F.1/	8.0

TABLE 2. Rind injury and decay in early oranges, treated with Dowicide A plus formaldehyde and stored one week at 50° F. followed by one week at 70° F. Average of 14 tests.

Treatment	Rind Injury	Total Decay
Control (water only for 2 minutes at 100° F.)	3.0	13.8
2% Dowicide A for 2 minutes at 100° F.	21.9	2.5
2% Dowicide A + formaldehyde (4.5 to 1) for 2 minutes at 100° F.	6.4	3.3

TABLE 3. Rind injury and decay of oranges treated and stored one week at 50° F. followed by one week with Dowicide A plus formaldehyde in the packing house at 70°.

	1¼% Dowicide A plus formaldehyde applied as a flood spray		3% Dowicide A plus formaldehyde applied as a light mist	
	Rind Injury %	Decay %	Rind Injury %	Decay %
Test 1: Untreated	2.1	24.5	0	7.9
Treated	0	0	0	8.9
Test 2: Untreated	0	43.1	0	13.8
Treated	7.4	11.8	13.6	14.6
Average: Untreated	1.0	33.8	0	10.8
Treated	3.7	5.9	6.8	11.7

Classifed Ads

Will pay $5.00 for a used Citrus BUDDING KNIFE in fair condition. Can also use badly worn budding knives if still serviceable for $2.50. Will buy a number of "Rogue" citrus seedlings from nurserymen, 10 cents per seedling. Must be vigorous variant plants. Donald J. Nicholson, 1224 Palmer St., Orlando, Fla.

ORCHARD POWER SPRAYER — Prefer Friend. Tank 200 to 300 gals. Capacity 15 gals. up. Hose, accessories. TUNGSTON PLANTATION, LAMONT, FLORIDA.

CITRUS TREES—Best quality usual varieties on sour orange or rough lemon stock. Robt. P. Thornton, c/o Clay Hill Nurseries Co., Box 2880, Tampa, Florida.

WANTED — Washer for citrus fruit. Also complete equipment for small packing house. Owen Godwin, Sebring, Florida.

DREAM NAVEL ORANGE — Florida's earliest and finest-flavored juiciest fruit Patented under U. S. Plant Patent No. 625. Prolific and always ready to ship before October 15. Guaranteed to have 5½ gallons of juice per box and passes 10½ to 12½ to 1 by October 15 or sooner. Solids 11.25 to 11.75 before October 15. No budded trees for sale. Budeyes sold in 1000 lots $500.00 — bud your own stock. Budded trees $15000.00 per M. ROYAL PURPLE RESEARCH NURSERY, Orlando, Florida.